



VOLUME 4 NUMBER 4

OCTOBER 1987

ANTENNA MEASURING PARTY - A BIG DAY FOR ATV HAMS!

The 1987 ATCO Antenna Measuring Party and Get-Together was a lot of fun and well attended.

An account of the day's activities will be found on page two of this issue of the ATCO Newsletter.

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The ATCO Newsletter is the official publication of a group of television amateurs known as "AMATEUR TELEVISION IN CENTRAL OHIO" and is published in January, April, July, and October.

Membership in ATCO is open to any FCC licensed radio amateur who has an interest in amateur television.

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ANTENNA MEASURING PARTY WRAP-UP

Saturday 19 September 1987 will be long remembered by ATCO members. The day was nearly ideal (we could have used more sun and fewer clouds, maybe). In spite of the early morning mist, approximately 35 persons gathered at WBBURI's OTH to measure their antennas, enjoy the lunch and refreshments, and have a darn good time!

After lunch, a short informal meeting was held presided over by Bill, W8DMR. Bill gave a summary of ATCO accomplishments and progress so far in 1987. Warren, KA8GZQ, Acting ATCO Treasurer, brought us up-to-date concerning ATCO finances.

Awards were presented to three ATCO ATVers. Bill, WB8ELK, was recognized for his "WB8ELK ATV Balloon Launch." Bill, WBBURI, received the "Most ATV DX 1987" award. Your ATCO Newsletter Editor was presented with the "Editor of the Year 1987" trophy.

Eric, KABZNY harmonic, drew names out of a brown paper bag, and the lucky winners of the three black and white TV cameras were: Foster, W8EHW; Bill, WB8ELK; and Bill, WBBURI.

Those who deserve our thanks for making the 1987 Antenna Measuring Party a success are:

Bill, W8DMR, for his leadership in causing the 1987 Antenna Measuring Party to become a reality, for providing the trophies that were awarded, for arranging for the engraving of the citations on the trophies, and for furnishing the three door prizes.

Bill, WBBURI, and Jane, WBBURI XYL, for the use of their lovely home and grounds.

Chuck, WB8LGA; Dick, W8RVH; Tom, KABZNY; Bill, WBBURI; and Bill, W8DMR, for furnishing their electronic equipment and supplies.

Jane, WBBURI XYL, for the luscious apple cake; Patty, W8DMR XYL, for the delicious baked beans and the delectable and beautifully decorated ATCO cake; and Maxine, KA8GZQ XYL, for her help in serving the lunch, for the potato salad, and for the tasty fruit bars.

And ALL OF YOU WHO ATTENDED!

WEATHER RADAR

The Dayton ATV Repeater televises the weather radar display. The weather video is brought up by using touch tone "5" for five seconds. For additional touch tone information concerning the operation of this repeater, see page six of the April 1987 issue of the ATCO Newsletter.

ATCO MEMBERSHIP INCREASES 46%!

Since the July issue of the ATCO Newsletter, eleven new members have been added to our roster.

We welcome the following:

Guy, K8HVA	Steve, KBISM	Dale, WA8KQQ	Chuck, WB8LGA
Mike, WB8MMR	Perry, WB8OTH	Chick, W8RZG	Dave, WB8TMP
Bob, WB8TV	Tom, KA8ZNY	Willard, WA8ZVN	



EDITORIAL COMMENT

Publication of the ATCO Newsletter is dependent on the availability of material submitted by our members. During the past year, ten ATCO ATVers have provided us with technical writings, information of general interest to ATV hams, and letters.

As you know, our organization operates as a result of the voluntary efforts of our members and will continue to flourish only if we have your cooperation.

Share your technical expertise, your personal ATV experiences, and your comments regarding amateur television with the other 34 members of ATCO.

Please consider making a written contribution of your choice to be included in an early issue of the ATCO Newsletter.

Your ATCO--Newsletter Editor will gladly assist you in the preparation of your articles - give him a call.

SUMMARY OF RESULTS OF 1987 ANTENNA MEASURING PARTY

Antennas were measured at 23 cm (1270 MHz) and 70 cm (439 MHz). There were approximately 30 antennas presented for testing. Gain measurements ranged from +18 dB to -15 dB. ATCO members brought dipole, Yagi, Quaqi, loop Yagi, corner reflector, collinear, omni wheel, parabolic, planar array, and many other antennas defying description. Table 1 lists the results of testing. The data shown in the table is considered to be reasonably accurate. All antennas were terminated with a 50 ohm coaxial load. ATV antenna plots are displayed on page ten. (Submitted by Bill, W8DMR.)

Table 1
Tabulation of Measurements

Item	Antenna Name	Elements	dBd Gain	70 cm	23 cm	Call
1.	Planar array	80	16		X	WB8RVH
	Planar array	120	14		X	
	Parabolic	D=32 in.	7		X	
2.	Mini corner	1	4		X	WB8UGV
	Loop Yagi	20	9		X	
3.	Yagi	5	3		X	WB8CCW
4.	Loop Yagi	25	11		X	WA8EDY
5.	Loop Yagis (4)	92	18		X	KABZNY
	Loop Yagi (1)	23	12		X	
6.	Loop Yagi	23	14		X	WB8OTH
7.	Mini quad	2	6	X		WB8ELK
8.	Corner refl.	1	6	X		WB8DMR
9.	Parabolic	D=60 in.	11	X		WB8BW
	Yagi	10	-15	X		
10.	Collinear	24	10.5	X		WA8KQO
11.	Yagi	32	21	X		WA8RMC
12.	Mini omni	2	-5	X		KABZNY
13.	Experimental	4	-5	X		WB8JEN

Notes:

- Item 1. 40 directors were added to 80 el. planar array.
- Item 2. Mini corner with 1/2 wl reflector side length.
- Item 5. H array with four loop Yagis with power divider.
One loop Yagi from the four used in H array.
- Item 7. Mini quad used for mobile operation.
- Item 9. Parabolic section, commercial, modified, vertical axis.
Balun for Yagi was defective.
- Item 10. Collinear, 24 elements, in vertical axis.
- Item 11. Yagi, 32 el., tested at 439 MHz, cut for 432 MHz.
- Item 12. Mini omni, exhibited a figure eight pattern.
- Item 13. Experimental, original idea and back to the drawing board for refinement.

ATCO MEMBERSHIP TOTAL IS NOW 35!

VIDEO MODULATION FOR THE APX-6

Many articles have been written dealing with the modification of the APX-6 transponder from World War II concerning changing it to a higher frequency, to AM sound modulation, or both. As far as is known, there have been no details published on how to modify this unit for video. The following information shows what is required to rework the APX-6 for plate modulation. The most important step in modifying the APX-6 is to remove the plate by-pass capacitor and replace it with a B+ feed-thru as shown (see Fig 1). A schematic diagram for a video modulator is included in this issue of the ATCO Newsletter (see page 6).

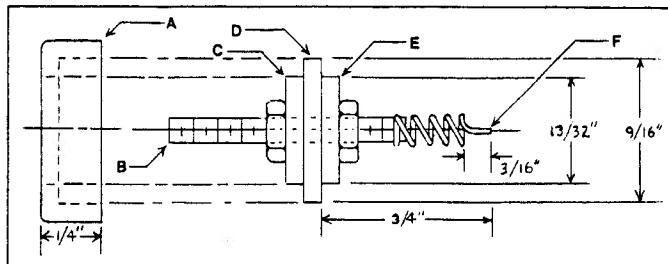


Fig 1-B+ FEED-THRU FOR THE APX-6

- A. Nut from existing plate by-pass. If nut is not available, it may be made by cutting down a PL-259 (RS-278-196).
- B. 6-32 stud and large nuts.
- C. Fiber washer, diameter to fit hole in nut "A".
- D. Steel flat washer, 1/4" cap screw, diameter to fit inside by-pass nut.
- E. Fiber feed-thru, diameter to fit inside cavity opening.
- F. Tempered copper wire. Center conductor from coax wound into five coil spring and soldered to 6-32 stud as shown.

(Note: Some units come with a long reach by-pass assembly. It is not known if that nut can be shortened and used.)

The next step is to obtain or make a coaxial fitting (see Fig 2) that will be accepted by the transmitter cavity output. This item can be made from a half-inch flared fitting used for copper water pipe. Such a fitting can be purchased from most hardware or plumbing stores. If your APX-6 is not modified, follow the instructions of your choice. The best way to cut the transmitter plunger is not to remove it from the gears, but run it all the way out and cut the plunger with a plumber's tubing cutter. (Submitted by John, WA8EOY.)

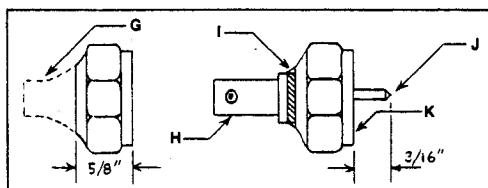


Fig 2-COAXIAL FITTING DETAILS

- G. Cut off and discard.
- H. BNC fitting.
- I. Solder nut of BNC to modified fitting, then install BNC fitting.
- J. Pointed #18 wire soldered to center pin of BNC fitting.
- K. Thread of fitting is the same pitch diameter, but NOT the same thread pitch. Insert pointed center pin in cavity connection, then thread on the fitting until it is tight.

(NOTE: Fig 1 and Fig 2 are not drawn to scale.)

VIDEO MODULATOR FOR MEDIUM SIZED TUBES

Shown below is a schematic diagram which provides a video modulator to be used when grid modulation and/or linear operation is not possible. The circuit is a cathode follower driven by video amplifiers Q1 and Q2 to form a plate modulator. Two tubes have been chosen to offset the cost of high voltage high current solid-state devices. Parts selection results in a happy marriage between solid-state and vacuum tubes. The circuit may be adjusted to modulate the family of high frequency triodes such as: 2C39, 2C42, 2C43, etc. Adjustment of R16 and R17 will set the output level and voltage drop across V1. (Submitted by John, WA8EOY.)

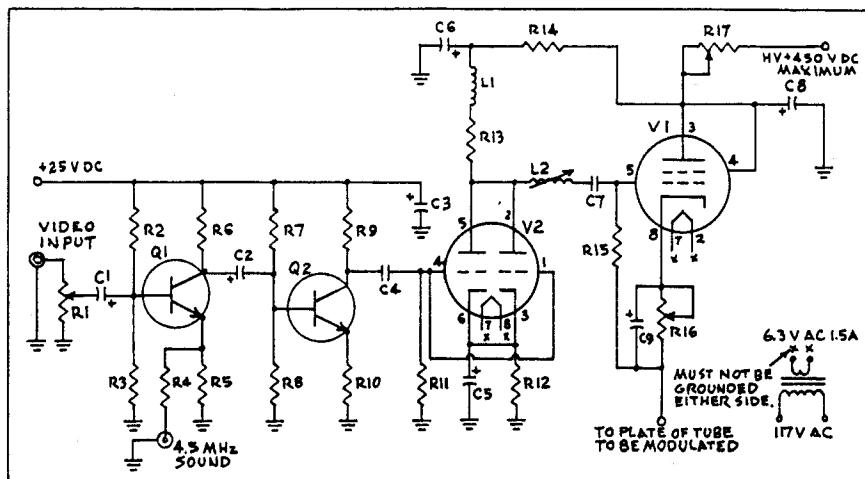


Fig 1—SCHEMATIC DIAGRAM OF THE VIDEO MODULATOR

C1, C2, C3 = 100 μ F, 35V
(272-1028)
C4 = 0.22 μ F, 50V (272-1070)
C5, C9 = 47 μ F, 35V (272-1015)
C6 = 40 μ F, 350V
C7 = 1.0 μ F, 250V (272-1055)
C8 = 80 μ F, 450V
L1 = 125 turns #30 wire,
1/4" diam. form,
scramble wound
L2 = 100 turns #30 wire,
1/4" diam. form, slug
tuned, scramble wound
V1 = 6L6, etc.
V2 = 6SN7GT
R1 = 100 ohms, pot, may be 500
ohms with 100 ohms resistor
in parallel (271-226
and 271-012)

R2 = 10 k ohms (271-034)
R3, R6, R9 = 1 k ohms (271-023)
R4 = 470 ohms (271-019)
R5 = 100 ohms (271-012)
R7 = 33 k ohms (271-040)
R8 = 4.7 k ohms (271-030)
R10 = 330 ohms (271-017)
R11 = 1 M ohms (271-059)
R12 = 220 ohms, 2 W
R13 = 1.5 k ohms, 2 W
R14 = 10 k ohms, 5 W
R15 = 100 k ohms (271-045)
R16 = 250 ohms, w/slider,
5 to 10 W
R17 = 1 k ohms, w/slider,
20 to 50 W
Q1, Q2 = 2N3904 (276-2016)

NOTE: Numbers in parentheses are Radio Shack.

NEWS DEADLINE FOR JANUARY ATCO NEWSLETTER IS 15 DECEMBER 1987!

ATV NEWS ITEMS OF INTEREST

By Bill, WB8DMR

THE JULY 25th BALLOON LAUNCH - This was a lofty success! Several ATVers heard the 144.34 MHz beacon and saw the video ID seconds after the 1:28 p.m. EDT launch. The following is a brief report of the technical aspects of the event: the 100 mW beacon was very strong and was heard in many states; the video signal faded in and out as the balloon rotated; the omnidirectional horizontally polarized antenna was damaged during the launch; the video ID cut out numerous times during the ascension to approximately 60-100 thousand feet; and it is believed that the lithium battery pack quit operating. The chase plane pilot reported he saw an unknown package fall, and it was not determined if the balloon burst before transmission ceased. Kudos to Bill, WB8ELK, for raising ATV to new heights.

INDIANAPOLIS ATV REPEATER - Requires the 2-meter 16/76 repeater located there to be brought up, and a touch tone star code (*) to bring up the ATV. The repeater ID is a color bar pattern with call letters.

ATV AIRPLANE FLIGHTS - These flights are continuing on Friday evening and on Sunday afternoon at about 5:30 p.m. from an altitude of approximately 12 thousand feet. Two-way ATV contacts have resulted. The plane flies the Akron-Canton to Chicago route, and the audio link is on 144.34 MHz. The pilot is Jim, WA8VWY, who flew the chase plane for three hours during the ATV balloon launch. A vertically polarized antenna is required for good pictures.

PITTSBURGH ATV REPEATER - Transmits and receives vertically. The repeater operates on 421.25 MHz. Can you tune this low?

1.2 GHz ATV TESTING CONTINUES - During July, August, and September, the following stations have been active: WB8DMR; NBDUK; WB8EHW; WA8EOY; WA8RUT; W8RVH; WA8TTE; WB8UGV; WB8URI; and K8YAH. Dick, W8RVH, has added a mast-mounted preamp before his R-7000 receiver and reports that a 0.5 microvolt input signal provides a meter reading of about 55. Also, an additional broadband amplifier has been placed between the end of his antenna feed line and his receiver. Dick has completed his 100 element planar array with reflector for 23 cm.

FANTASTIC ATV LOCATION - WA8ZVN, Willard, is located about 11 miles west of Chillicothe, Ohio. His location, tower, mast, and antenna place his radiator at approximately 1500 feet above mean sea level. WA8ZVN's very strong 5 watt-average TV signal is proof positive.

ERIE, PA., REPEATER - ATV Hams are using horizontally polarized 2-meter antennas for ATV liaison - ugh! However, there are valid reasons for this; some ATVers near Cleveland operate 2-meter horizontally polarized, and the use of horizontal polarization on 2-meters conserves available mast space.

ADDING A CAMERA CONNECTOR TO THE PC-1

It is convenient to have a camera connector mounted on the PC-1. The main purpose of the connector is to provide power to the camera when the PC-1 is being supplied by an external dc power source. This arrangement is ideal for mobile ATV operation and greatly simplifies cable connections.

External sync drives are not needed. All that is required is a plus 12 volt dc source and the video output that the PC-1 transceiver uses to modulate the transmitter. Audio from the camera can be used by the PC-1, also, if desired.

The connector can be purchased from Calrad Electronic Products for about four dollars. The part number is 30-352. It is a female video camera socket with ten pins and is a chassis mounting type with locking threads which mate with the standard video camera. A lock washer and mounting nut are supplied. The pin-outs for the connector are listed below. (Submitted by Bill, W8DMR.)

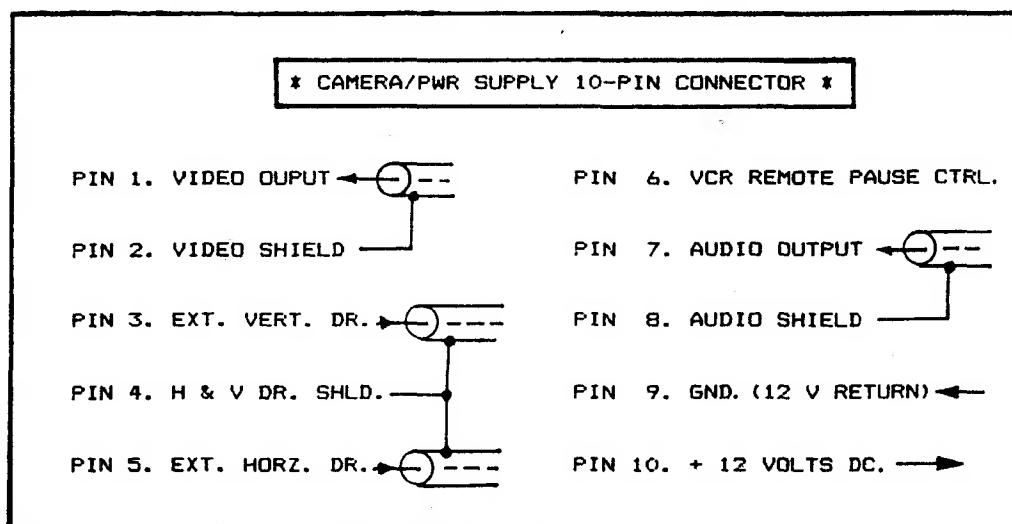


Fig 1-CAMERA/POWER SUPPLY 10-PIN CONNECTOR

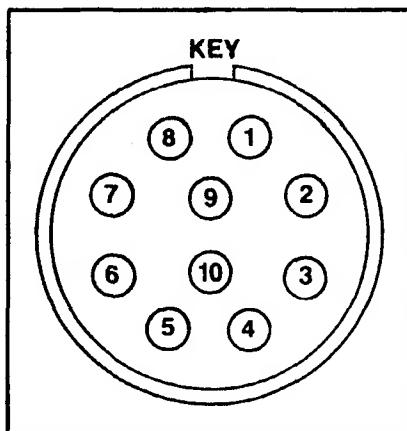


Fig 2-PIN VIEW ON POWER SUPPLY

ATCO MEMBERSHIP INFORMATION

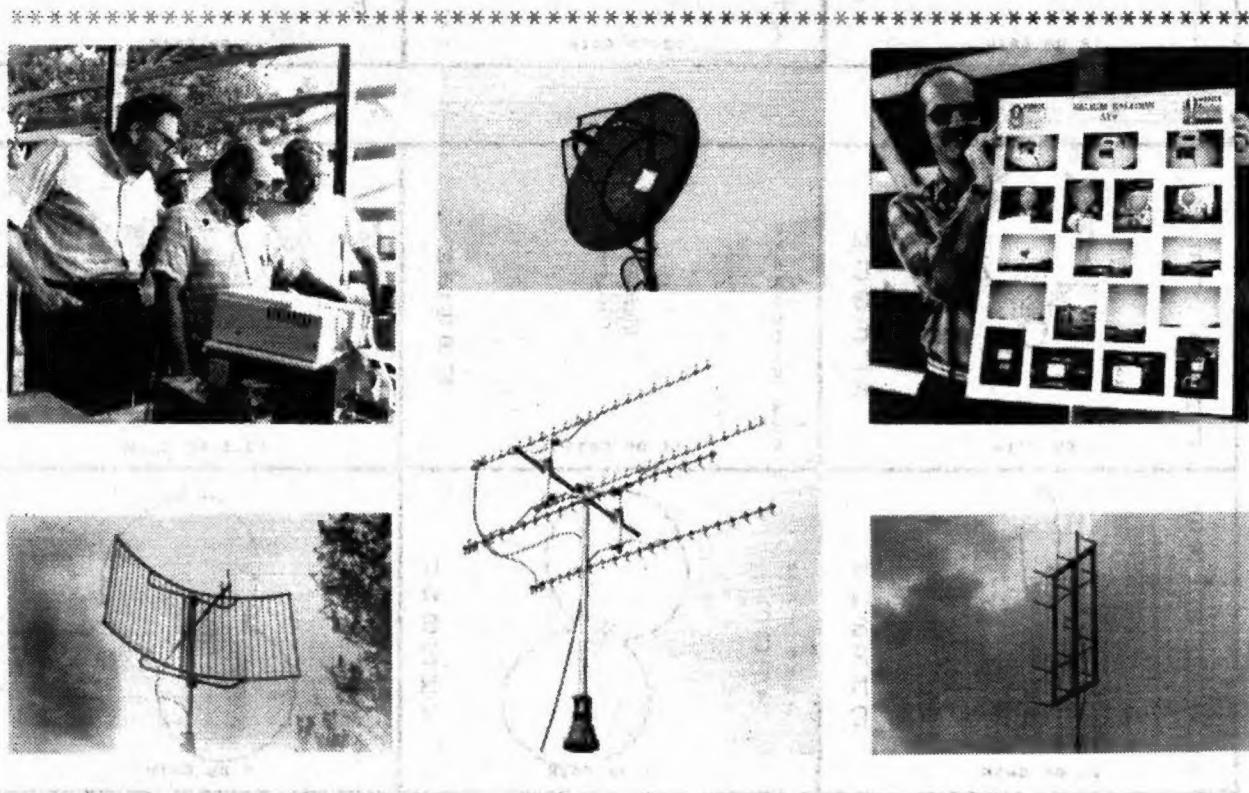
All current ATCO memberships are due to expire on 31 December 1987. The "12-87" at the end of the first line on your ATCO Newsletter mailing label indicates your expiration date.

Members of record on 31 December 1987 will receive the January 1988 issue of the ATCO Newsletter. However, only those members who have renewed their membership before 31 March 1988 will receive the April, July, and October issues at the time of publication. A person renewing his membership after 31 March will be placed on the membership list retroactive to 1 January 1988 and will receive all newsletters published during the current year prior to his renewal date. Such renewing member's expiration date shall be 31 December 1988.

For those joining ATCO for the first time during 1988, memberships are retroactive to 1 January 1988 and will expire on 31 December 1988. New members will receive all issues of the current year prior to joining ATCO. For example, a new member joining on 28 April 1988 will receive the January and April 1988 issues and the July and October 1988 newsletters.

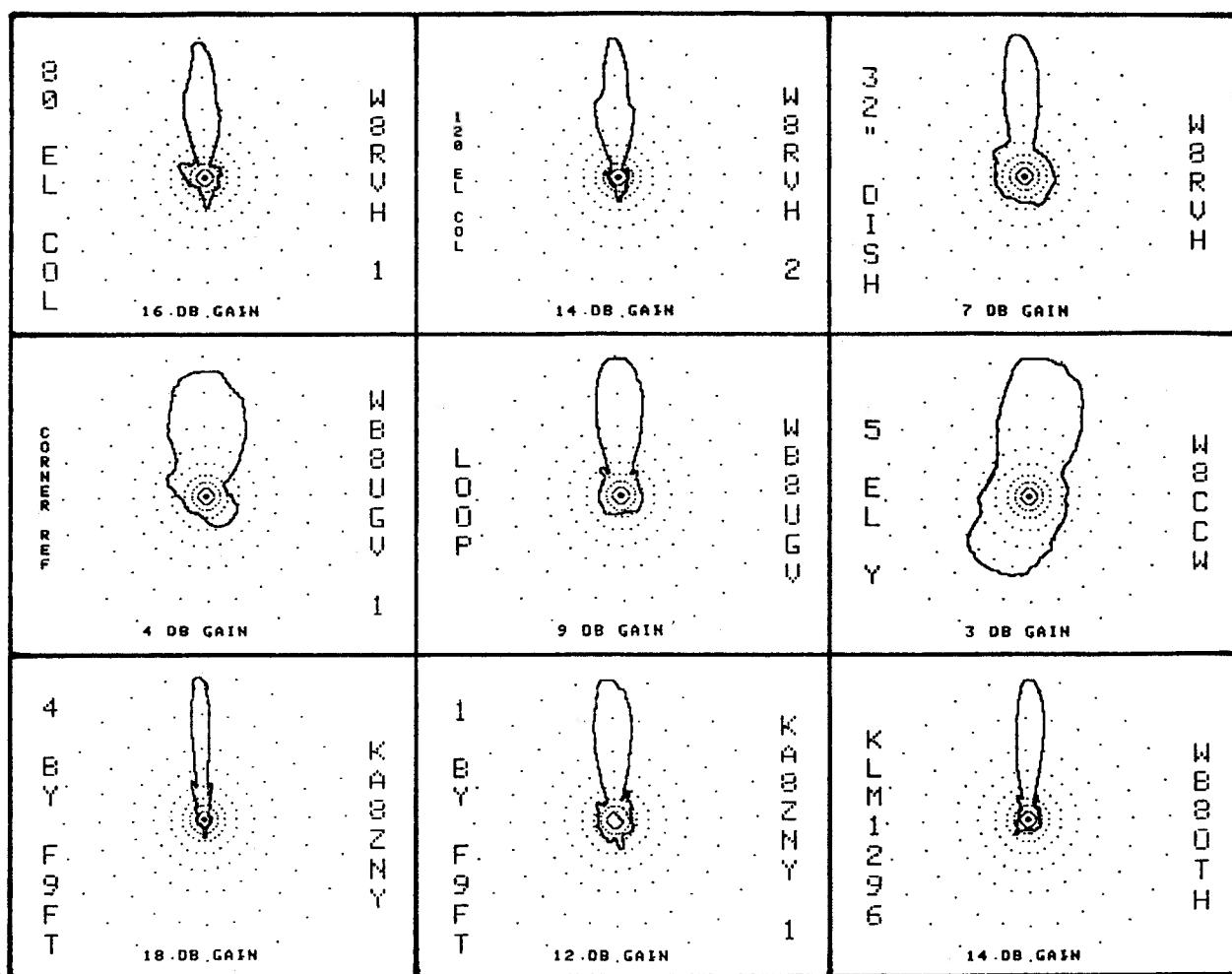
The annual dues remain at ten dollars.

Please renew your membership at your earliest convenience and be sure to receive the ATCO Newsletter without interruption. For renewal of your membership, use the ATCO Membership Application on page 15.

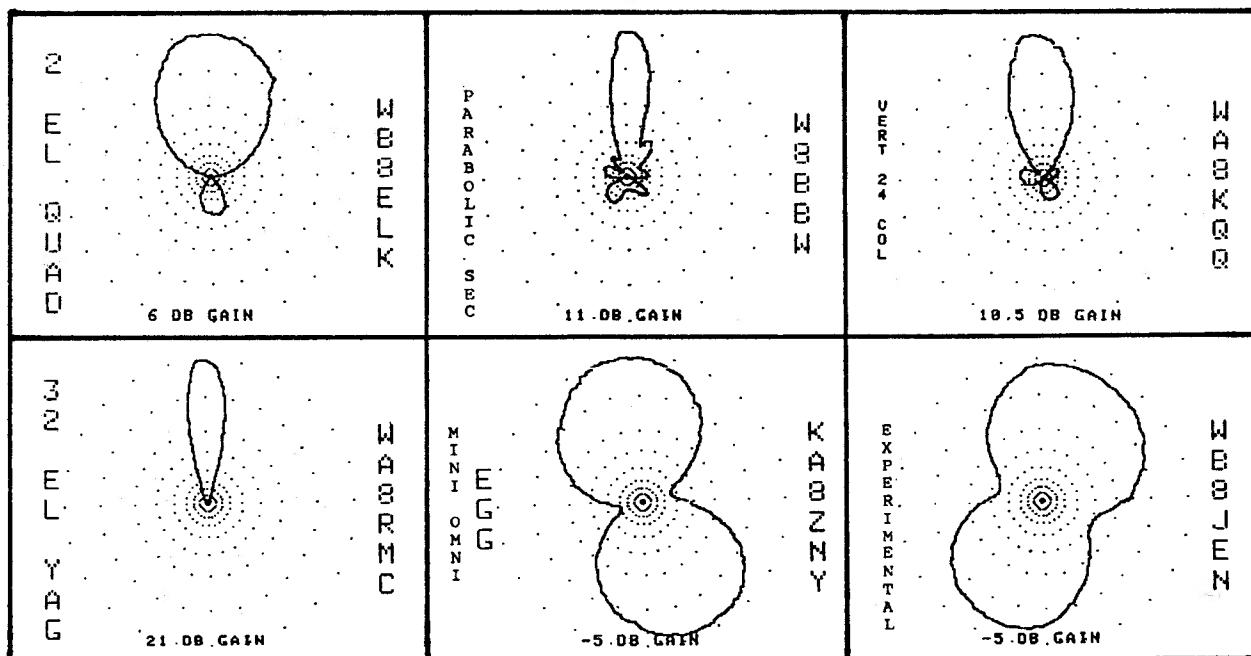


ATV ANTENNA PLOTS

---23 cm Antennas---



---70 cm Antennas---



LETTER TO THE EDITOR

ATCO ATV Repeater - In the July 1987 issue of the ATCO Newsletter, Bill, W8DMR, suggested several projects for consideration and possible implementation by ATCO members. As a result, we had the 1987 ATCO Antenna Measuring Party and Get-Together on Saturday 19 September.

One of the items listed for consideration was the resurrection of the ATCO ATV repeater. After some thought, it is believed that the man hours and technical expertise required for this project seem questionable when weighed against the benefits to be derived by ATCO members - especially considering the quality of our local 439.25 stations. However, there may be another way to use the ATCO equipment to put ATCO "ON THE AIR," provide local benefits, and stimulate technical improvements.

A video beacon transmitter with a 2-meter control link using touch tones would give the group a base system to grow with and to experiment on. A list of benefits includes the following:

1. Hold onto our repeater frequency allocation - use it or lose it!
2. An excellent test signal source to compare improvements in antennas, converters, preamps, feed lines, etc.
3. An indicator of band conditions, particularly distant stations. Gets them pointing at Columbus.
4. Stimulates interest in ATCO and ATV.

Technically, this system would be much easier to get operating and to maintain. With all the old Vic 20's, Cocos, etc. laying around collecting dust, we could use one or more for a controller from the 2-meter link and to generate computer video. Several screens could be generated to supply test patterns, bulletin boards, membership information, etc.

There are many things we could do from a technical standpoint, such as: a switchable power output level, 1 watt or 10 watts; repeating the 2-meter audio input on 4.5 MHz subcarrier; and how about packet input on 2-meters, displaying it on the video, then with a disk drive and a screen saver program a message could be left.

Later a 1296 input could be added. This would make the system a real repeater while still bypassing the difficulties of in-band filtering plus encouraging 1296 expansion.

The advantage of this arrangement is that we can start simple and expand when we want. If this sounds interesting to you, let's discuss it on the ATCO Tuesday Night Net. We need a list of what equipment is available, discussions on exact frequencies for both bands, a site location, antenna polarization, etc.

Bob, WB8JEN

CRAFTS: ROTATOR SCHEMATICS

Sooner or later most antenna rotator systems need some type of maintenance and/or repair. Rotors purchased at hamfests or discarded units are seldom found with schematics. Two schematic diagrams covering four series of production runs are shown on the following page. These diagrams are for the popular CDR units.

Studying the schematics before attempting to repair the rotor is the best way to begin. Depending on the amount of usage, the motor phase-shift capacitor located in the control box usually requires replacement periodically. The capacitor is a nonpolarized dc electrolytic component in the range of 125 to 225 μ F. A good practice is to keep a spare capacitor available for substitution testing. Not all electronic parts stores stock the capacitors.

If you would like more rotor schematics, such as the Alliance 100/110, to appear in future issues of the ATCO Newsletter, contact the ATCO Newsletter Editor. (Submitted by Bill, W8DMR.)

(continued on page 13)

ATCO FINANCIAL STATEMENT

CASH BALANCE:	
As of 26 June 1987.....	\$179.33
RECEIPTS:	
Dues.....	\$120.00
EXPENDITURES:	
Printing charges for July 1987 ATCO Newsletter.....	\$ 25.32
Printing charges for Antenna Measuring Party issue....	5.55
Printing charges for reprints for new members.....	22.63
Food and refreshments for Antenna Measuring Party....	53.82
Misc. costs incidental to publication of newsletter..	18.14
Total.....	\$125.46
SUMMARY:	
Cash Balance as of 26 June 1987.....	\$179.33
Receipts.....	120.00
Expenditures.....	-125.46
Balance as of 30 September 1987.....	\$173.87
POSTAGE STAMP INVENTORY:	
Stamps on hand as of 26 June 1987.....	74
Stamps used.....	-64
Stamps on hand as of 30 September 1987.....	10

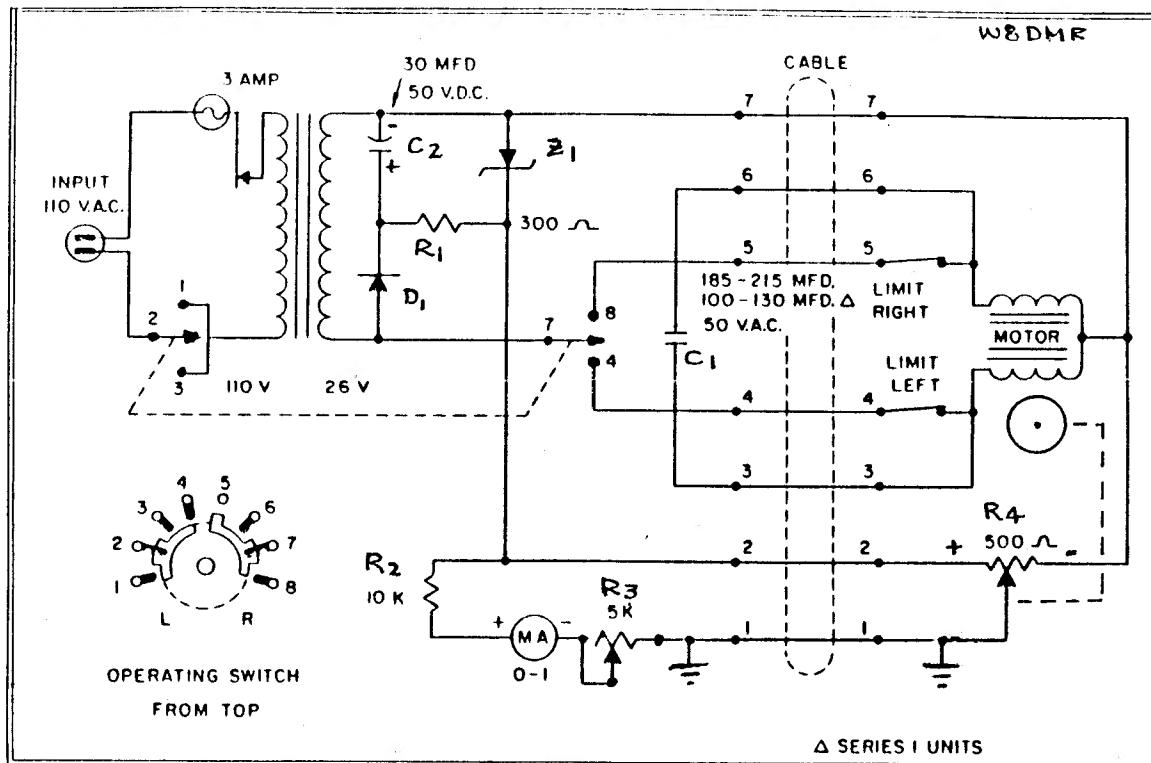
*Note: KABLWR paid for associate membership (no longer available) prior to 23 October 1986 and just before suspension of ATCO activity.

The above financial report was prepared as of 30 September 1987 by Warren G. Duemmel, KABGZQ, Acting ATCO Treasurer.

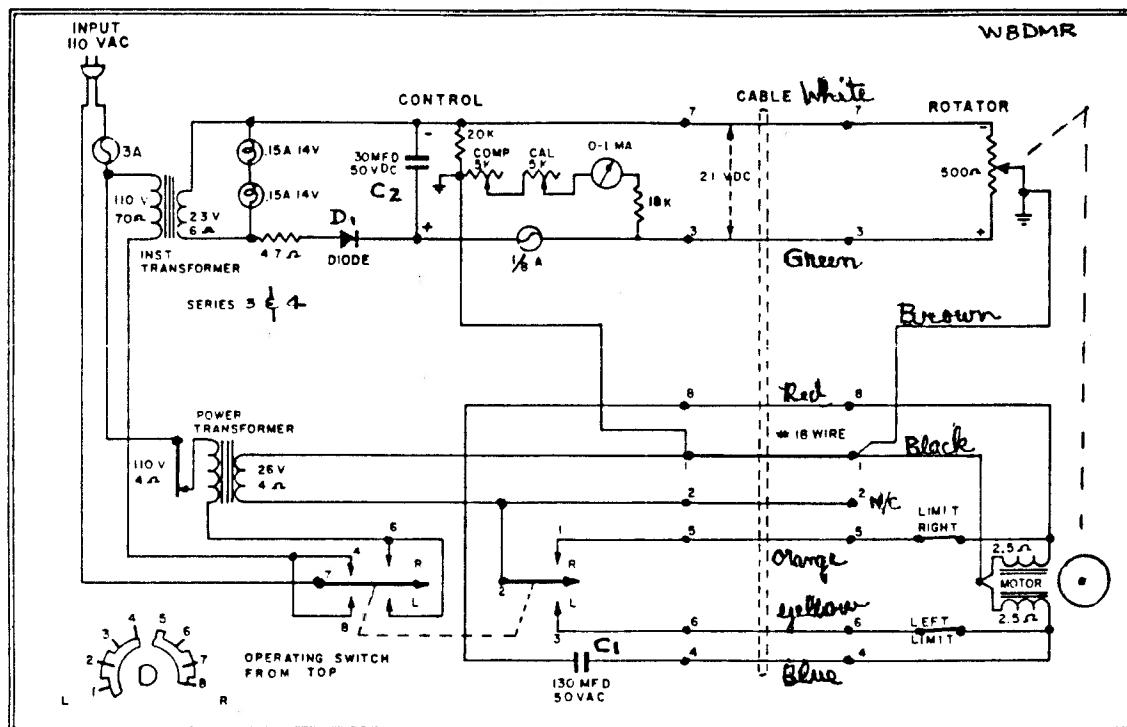
ANTENNA ROTOR SCHEMATICS

(continued from page 12)

Schematic Diagram SERIES 1 and 2



△ SERIES 1 UNITS



Schematic Diagram SERIES 3 AND 4

ARITHMETICKER

An ohmmeter and a wattmeter together cost \$75.00. The wattmeter costs \$26.00 more than the ohmmeter. Find the cost of (a) the wattmeter and (b) the ohmmeter. The solution will appear in the January 1988 issue of the ATCO Newsletter.

***** OUR CONTRIBUTORS

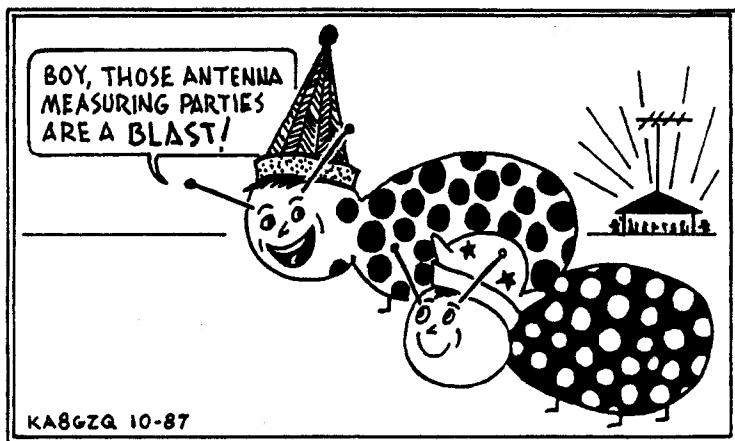
Thanks to the following ATVers for their contributions to this issue of the ATCO Newsletter.

John, WA8EOY, for two articles - "Video Modulation for the APX-6" and "Video Modulator for Medium Sized Tubes."

Bill, WB0MR, for the CDR antenna rotor schematics, his paper "Relating Noise Figure to Noise Temperature," and the article "Adding a Camera Connector to the PC-1." Also, Bill keeps us up-to-date with what's going on in ATV with his column "ATV News Items of Interest" and the "Summary of Results of 1987 Antenna Measuring Party."

Bill, WB7FRO, for another head scratching "Arithmeticker."

Bob, WB8JEN, for his "Letter to the Editor" which should cause some interesting discussion on the ATCO Tuesday Night Net.



***** ATCO NET REMINDER

Just a word to let you know that the ATCO Tuesday Night Net will be heard at 8:00 p.m. after the change back to Eastern Standard Time. Also, we wish to thank those who have volunteered to keep the net active during the past several months.

***** SOLUTION TO JULY ARITHMETICKER

The correct answer was C. 4.472. $P = I^2 \times R$, $100/(1.414^2) = 50$ ohms (Z of line). The square root of $1000/50 = 4.472$ amps.

ATCO MEMBERS AS OF 30 SEP 1987

K8AEH	Wilbur Wollerma	KABLWR	Marlin Alberty
	1672 Rosehill Road		1645 Olentangy Road
	Reynoldsburg 43068		Bucyrus 44820
W8AER	David Sears	WB8MMR	Mike Kries
	1678 Kaiser Drive		1715 Winding Hollow Dr.
	Reynoldsburg 43068		Columbus, Ohio 43223
WBCCW	John Ferrell	WB8OTH	Perry Yantis
	3722 Wagner Court		1850 Lisle Avenue
	Grove City 43123		Obetz 43207
WBDMR	William Parker	WA8RMC	Arthur Towslee
	2738 Floribunda Drive		180 Fairdale Avenue
	Columbus 43209		Westerville 43081
N8DUK	Ron Reynolds	WA8RUT	Ken Morris
	4642 Glengate Drive		3181 Gerbert Road
	Columbus 43232		Columbus 43224
WB8HW	Foster Warren	W8RVH	Richard Goode
	124 East Clark Street		9391 Ballentine Road
	North Hampton 45349		New Carlisle 45344
WB8ELK	Bill Brown	W8RZG	Corwin Miller
	12536 T.R. 77		4966 Haughn Road
	Findlay 45840		Grove City 43123
WA8EDY	John Schlaechter	WB8TMR	Dave Bourne
	3199 Lewis Road		2200 Dividend Drive
	Columbus 43207		Columbus, Ohio 43228
WB8FRQ	William Ennis	WA8TTE	Phil Morrison
	146 South Weyant Avenue		154 Llewellyn Avenue
	Columbus 43213		Westerville 43081
WB8FWQ	Christopher Vojsak	W8TV	Bob Dye
	2050 Ellington Road		6118 Sedgwick Road
	Columbus 43221		Columbus 43085
KABGZQ	Warren Duummel	ND8U	Philip Brooks
	3488 Darbyshire Drive		412 Franklin Street
	Hilliard 43026		Piqua 45356
K8HRR	Ira Bickham	WB8UGV	Bruce Jaquish
	260 Tiki Drive		193 Cherry Drive,
	Merritt Is., FL 32952		Centerville 45459
K8HVA	Guy Cunningham, Jr.	WB8URI	William Heiden
	31 Birchfield Street		4435 Kaufman Road
	Plymouth 44865		Plain City 43064
KBISM	Steve Iacono	WABVWM	Lou Williams
	1075 Virginia Avenue		4720 Blacks Road SW
	Columbus, Ohio 43212		Pataskala 43062
WB8JEN	Bob Mills	K8YAH	Ronald Vanke
	6834 Halligan Avenue		5094 Longrifle Road
	Worthington 43085		Westerville 43081
K8JGY	Fred Yost	KABZNY	Tom Taft
	330 Dellfield Way		386 Cherry Street
	Gahanna 43230		Groveport 43125
WA8KOO	Dale Waymire	WABZVN	Willard Mathuews
	225 Riffle Avenue		221 Black Run Road
	Greenville 45331		Chillicothe 45601
WB8LGQ	Charles Beener		
	2548 State Route 61		
	Marengo 43334		

ATCO MEMBERSHIP APPLICATION

RENEWAL [] NEW MEMBER [] CHARTER MEMBER [] DATE.....

NAME..... CALL.....

ADDRESS..... HOME PHONE.....

CITY..... STATE..... ZIP.....

PLACE OF EMPLOYMENT..... BUS. PHONE.....

HAM INTERESTS..... LICENSE CLASS.....

I WILL TAKE ATCO NET-CONTROL TWICE A YEAR..... [YES]..... [NO]

I WILL SUBMIT NEWSLETTER MATERIAL TWICE A YEAR [YES].... [NO]

ANNUAL DUES PAYMENT OF \$10 ENCLOSED..... CHECK []..... CASH []

...MAKE CHECK PAYABLE TO WARREN G. DUUMMEL, ACTING ATCO TREASURER.

...MAIL TO KABGZQ, 3488 DARBYSHIRE DRIVE, HILLIARD, OHIO 43026...

Edi Torni, Warren, KAB6ZD

FIRST CLASS MAIL

ATCO NEWSLETTER
C/O Warren G. Dummel
3488 Darbyshire Drive
Hilliard, Ohio 43026



ANTENNA MEASURING PARTY ISSUE

